APPENDIX A

CLAIMS

What is claimed is:

1. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations, the apparatus comprising:

a. an explicit system and a classifier each configured to receive a system state dataset the explicit system connected with the classifier and operative to iteratively perform a combinatory search procedure based on the system state dataset to develop a next test recommendation for the classifier, whereby the classifier performs the next test to generate an objective weighted score;

b. a profit module connected with the classifier and with the explicit system to receive the objective weighted score from the classifier, to add subjective value to the objective weighted score to determine a profit for the test, and to provide the profit to the explicit system to enable the explicit system to i. assess the value of its next test recommendation and ii. to iteratively generate a best test recommendation based on the maximization of the profit;

c. an implicit system configured to receive a system state dataset, and connected with the explicit system to receive the best test recommendation for each system state dataset, and to act as a function estimator to learn to associate best test recommendations with the system state dataset in order to mimic the explicit system, thereby to enable rapid decision making in situations that are either urgent or well-known.

2. An apparatus for incorporating decision making into classifiers to provide efficient test recommendations as set forth in claim 1, wherein the explicit system and the implicit system are configured to provide test recommendations to a controller.

1   3. An apparatus for incorporating decision making into classifiers to provide efficient

2   test recommendations as set forth in claim **1**, wherein the implicit system is a neural

3   network.

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5   4. An apparatus for incorporating decision making into classifiers to provide efficient

6   test recommendations at set forth in claim **3**, wherein the neural network is a radial

7   basis neural network.

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9   5. An apparatus for incorporating decision making into classifiers to provide efficient

10   test recommendations as set forth in claim **3**, wherein the combinatory search

11   procedure performed by the explicit system is simulated annealing.

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13   6. An apparatus for incorporating decision making into classifiers to provide efficient

14   test recommendations as set forth in claim **5**, wherein the explicit system and the

15   profit module may be separated from the apparatus after the implicit system

16   sufficiently mimics the explicit system.

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18   7. An apparatus for incorporating decision making into classifiers to provide efficient

19   test recommendations as set forth in claim **1**, wherein the system state is a vector.

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21   8. An apparatus for incorporating decision making into classifiers to provide efficient

22   test recommendations as set forth in claim **1**, wherein the classifier is a probabilistic

23   model.

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25   9. An apparatus for incorporating decision making into classifiers to provide efficient

26   test recommendations as set forth in claim **8**, wherein the classifier is Bayesian.

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28   10. A computerized method for enhancing decision making in a classifier system,

29   wherein the classifier system includes an explicit system and a classifier, each

1   configured to receive a system state dataset, with the explicit system connected with

2   the classifier; a profit module connected with the classifier and with the explicit

3   system; and an implicit system configured to receive a system state dataset, and

4   connected with the explicit system, the computerized method comprising the steps of:

5   a. receiving a system state dataset in the explicit system, the classifier, and the

6   implicit system;

7   b. determining in the explicit system, based on the feature set, a recommended

8   test;

9   c. performing the recommended test on the classifier;

10   d. determining, via the profit module, the profit from the test performed on the

11   classifier;

12   e. detecting whether the test performed on the classifier maximizes the profit;

13   f. performing the receiving step a through the detecting step e until a test is found

14   which maximizes the profit;

15   g. training the implicit system with the system state dataset and the test which

16   maximizes the profit; and

17   h. repeating steps a through g until a desired level of training of the implicit

18   system is reached.

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20   11. A computerized method for enhancing decision making in a classifier system as set

21   forth in claim **10**, wherein the test that maximizes the profit is provided by either the

22   explicit system or the implicit system to a controller.

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24   12. A computerized method for enhancing decision making in a classifier system as set

25   forth in claim **10**, wherein the implicit system used is a neural network.

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27   13. A computerized method for enhancing decision making in a classifier system as set

28   forth in claim **12**, wherein the implicit system used is a radial basis neural network.

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2 14. A computerized method for enhancing decision making in a classifier system as set

3   forth in claim **12**, wherein the determining step b is performed by the explicit system

4   using a combinatory search procedure.

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6 15. A computerized method for enhancing decision making in a classifier system as set

7   forth in claim **14,** wherein the combinatory search procedure performed by the

8   explicit system in the determining step b is simulated annealing.

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10 16. A computerized method for enhancing decision making in a classifier system as set

11   forth in claim **15,** wherein the explicit system and the profit module used may be

12   separated from the classifier system after the implicit system sufficiently mimics the

13   explicit system.

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15 17. A computerized method for enhancing decision making into classifiers to provide

16   efficient test recommendations as set forth in claim **10,** wherein the system state is a

17   vector.

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19 18. A computerized method for enhancing decision making into classifiers to provide

20   efficient test recommendations as set forth in claim **10,** wherein the classifier is a

21   probabilistic model.

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23 19. A computerized method for enhancing decision making into classifiers to provide

24   efficient test recommendations as set forth in claim **18,** wherein the classifier is

25   Bayesian.

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27 20. A computerized method for enhancing decision making in classifiers to provide

28   efficient test recommendations, the computerized method comprising the steps of:

1   a. providing an explicit system and a classifier each configured to receive a

2   system state dataset, with the explicit system connected with the classifier,

3   and operative to iteratively perform a combinatory search procedure based on

4   the system state dataset to develop a next test recommendation for the

5   classifier, whereby the classifier performs the next test to generate an

6   objective weighted score;

7   b. providing a profit module connected with the classifier and with the

8   explicit system to receive the objective weighted score from the classifier, to

9   add subjective value to the objective weighted score to determine a profit for

10   the test, and to provide the profit to the explicit system to enable the explicit

11   system to assess the value of its next test recommendation, and, iteratively, to

12   generate a best test recommendation based on the maximization of the profit;

13   c. providing an implicit system configured to receive a system state dataset, and

14   connected with the explicit system to receive the best test recommendation for

15   each system state dataset, and to act as a function estimator to learn to

16   associate best test recommendations with the system state dataset in order to

17   mimic the explicit system, thereby to enable rapid decision making in

18   situations that are either urgent or well-known.

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20   21. A computerized method for enhancing decision making in a classifier system as set

21   forth in claim **20**, wherein the explicit system and the implicit system are further

22   configured to provide the test recommendation to a controller.

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24   22. A computerized method for enhancing decision making in a classifier system as set

25   forth in claim **20**, wherein the implicit system provided is a neural network.

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27   23. A computerized method for enhancing decision making in a classifier system as set

28   forth in claim **22**, wherein the implicit system provided is a radial bias neural

29   network.

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2   24. A computerized method for enhancing decision making in a classifier system as set

3   forth in claim **22**, wherein the explicit system provided performs the combinatory

4   search procedure by use of simulated annealing.

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6   25. A computerized method for enhancing decision making in a classifier system as set

7   forth in claim **24**, wherein the explicit system provided and the profit module

8   provided may be separated from the classifier system provided after the implicit

9   system sufficiently mimics the explicit system.

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11   26. A computerized method for enhancing decision making in classifiers to provide

12   efficient test recommendations as set forth in claim **20**, wherein the system state is a

13   vector.

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15   27. A computerized method for enhancing decision making in classifiers to provide

16   efficient test recommendations as set forth in claim **20**, wherein the classifier is a

17   probabilistic model.

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19   28. A computerized method for enhancing decision making in classifiers to provide

20   efficient test recommendations as set forth in claim **27**, wherein the classifier is

21   Bayesian.

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